LISTING OF CLAIMS

1.-2. (Canceled)

3. (Currently Amended) A waveguide structure according to claim 12, wherein the first planar waveguide, the second planar waveguide and the third planar waveguide are comprised of ~~the waveguide material is formed as~~ an optical polymer.

4. (Currently Amended) A waveguide structure according to claim 12, wherein the substrate is formed as an organic film material.

5. (Canceled)

6. (Currently Amended) A circuit board according to claim 15, wherein the electrical layers of the circuit board are coupled via opto-electrical or electro-optical transducers to the optical waveguide structure.

7.-10. (Canceled)

11. (Currently Amended) A method according to claim ~~7~~16, wherein the first and second fibers are glued in the troughs.

12. (New) An optical waveguide structure having a branching section and a crossing section, the optical waveguide structure comprising:

a substrate having a first trough, a second trough and a third trough defined therein;

in the area of the crossing section, a first fiber partially inserted into the first trough and a second fiber partially inserted into the second trough, wherein the first trough has a width substantially equivalent to a width of a core of the first fiber, the second trough has a width substantially equivalent to a width of a core of the second fiber, and the first trough and the second trough are configured such that the first fiber crosses over the second fiber; and

in the area of the branching section, a first planar waveguide formed within the first trough and a second planar waveguide formed within the second trough, wherein a coupling between the first planar waveguide and the first fiber resides within the first trough, a coupling between the second planar waveguide and the second fiber resides within the second trough, and the first planar waveguide and the second planar waveguide are configured to converge to form a third planar waveguide in the third trough.

13. (New) A waveguide structure according to claim 12, wherein the first, the second and the third planar waveguides are formed by adding an optical polymer in a fluid state to the first trough, the second trough and the third trough and curing the optical polymer by means of ultra-violet radiation.

14. (New) A waveguide structure according to claim 12, where the first, the second and the third planar waveguides comprise thin glass and are formed using an etching process.

15. (New) A multi-layer opto-electrical circuit board, comprising at least one layer with an optical waveguide structure that includes:

a substrate having a first trough, a second trough and a third trough defined therein;

in the area of the crossing section, a first fiber partially inserted into the first trough and a second fiber partially inserted into the second trough, wherein the first trough has a width substantially equivalent to a width of a core of the first fiber, the second trough has a width substantially equivalent to a width of a core of the second fiber, and the first trough and the second trough are configured such that the first fiber crosses over the second fiber; and

in the area of the branching section, a first planar waveguide formed within the first trough and a second planar waveguide formed within the second trough, wherein a coupling between the first planar waveguide and the first fiber resides within the first trough, a coupling between the second planar waveguide and the second fiber resides within the second trough, and the first planar waveguide and the second

planar waveguide are configured to converge to form a third planar waveguide in the third trough.

16. (New) A method for manufacturing an optical waveguide structure having a crossing section and a branching section, the method comprising:

forming a substrate as an organic film material;

hot stamping a first trough, a second trough and a third trough into the substrate, wherein, the first trough has a width substantially equivalent to a core of a first fiber, the second trough has a width substantially equivalent to a core of a second fiber, in the area of the crossing section, the first trough and the second trough intersect, and, in the area of the branching section, the first trough and the second trough converge to form the third trough;

arranging the first fiber partially within the first trough and the second fiber partially within the second trough, wherein the first fiber crosses over the second fiber at the crossing section;

after the step of arranging, adding optical waveguide material to areas of the first trough, the second trough and the third trough not occupied by the first fiber or the second fiber; and

curing the optical waveguide material with ultra-violet radiation.